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Fig. 6.

Philos. Trans N.^o 391

Plate III.

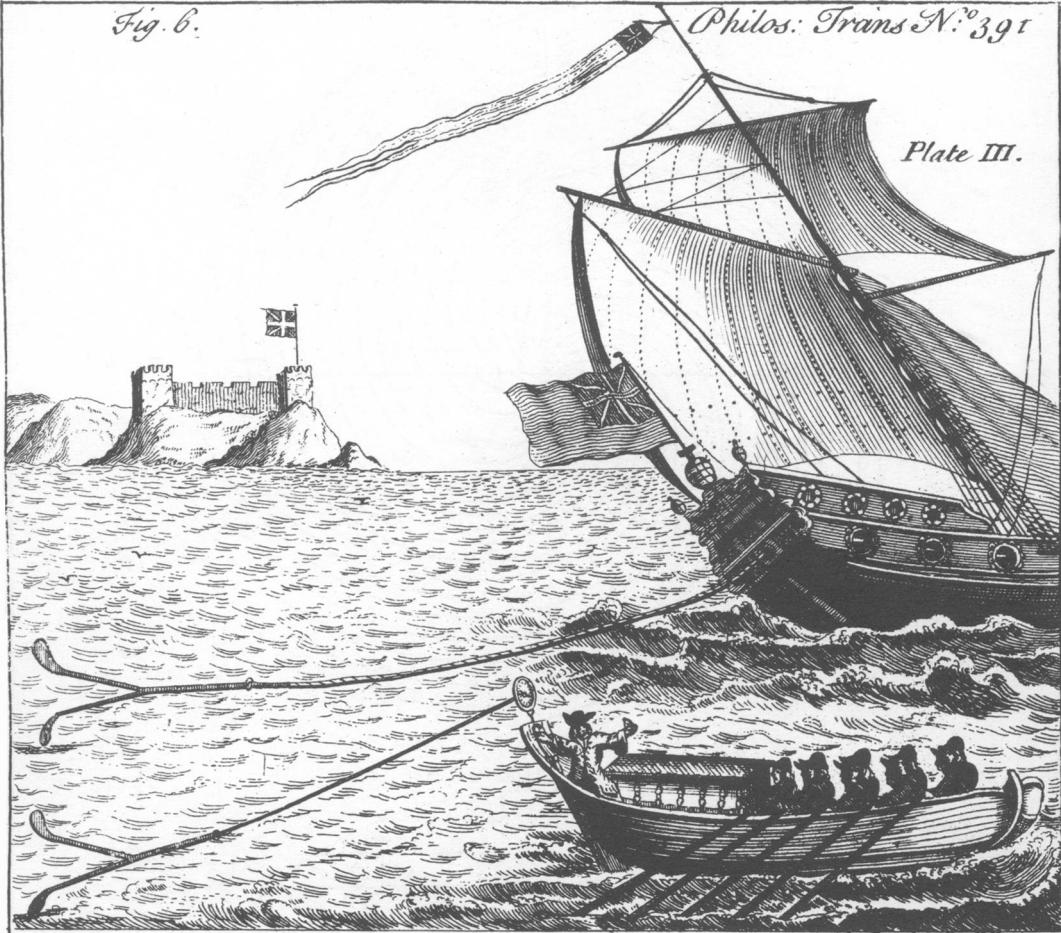
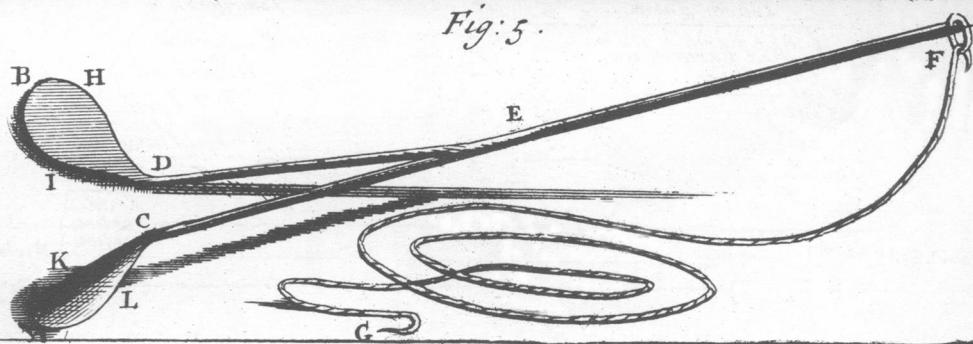


Fig: 5.



The Summer before the last, a Woman show'd me an Insect of the Maggot Species, with a crusty red *Galea* over the Snout, and a crescent or forked Tail, which she had just then voided by the urinary Passage.

V. *An Account of a new Machine, called the Marine Surveyor, contrived for the Mensuration of the Way of a Ship in the Sea, more correctly than by the Log, or any other Method hitherto used for that Purpose; together with several Testimonials, setting forth the Usefulness of this Invention. By Mr. Henry de Saumarez of the Island of Guernsey.*

Having for several Years applied my Studies to the Improvement of Navigation, I have fallen on various Projects, as well for the better clearing a Ship off a Lee-shore, as for her Steering, Tacking, or Waring, &c. which I may probably soon publish to the World: But what has most of all employ'd my Thoughts, has been to contrive something to ascertain the Way of a Ship in the Sea, more correctly than by the Log, (at present in Use in our Navigation;) the Errors of which are such, that I am fully persuaded the unhappy Fate of the brave Sir *Cloudsley Shovell*, was more owing thereto, than to any Errors in Judgment. The melancholy Reflections I made on that national Loss, was what spurr'd me on to find out something that would not only have a regular Motion under Water, but might communicate the same to a Dial, or Piece of Clock-Work, within the Ship.

M m m

After

After Variety of Experiments, I was at last so happy as to answer my Purpose in some Measure ; and as in *Guernsey* we are at a Loss for curious Workmen, in the Year 1715. I came to *London*, and furnished my self with a Boat, and all the Materials necessary for my Design. Daily was I on the River *Thames* making Experiments, and was frequently honoured with the Company of several of the *Literati*, who were greatly pleased with my Invention ; but, not being fully satisfied of the Certainty thereof, they advised me to try it on a Standing-Water. According to their Desire I did so, for I obtained a Liberty several Times of having a Boat on the Canal in *St. James's Park*, where I demonstrated, to such curious Persons as favoured me with their Company, the Usefulness of several Instruments ; for we there fixed two Poles for Marks, and notwithstanding I many Times alter'd the Motion of my Boat, by sometimes rowing fast, and at other Times slow, yet had my Machine under Water the same Number of Revolutions between the Marks. It may, perhaps, be ask'd, how I came to be assured that the Revolutions of the Engine under Water are regular, let the Motion be swift or slow, and that they answer the same Distance ? I will not yet say, that this admits of so clear a mathematical Proof, as any Proposition in *Euclid* ; however, I have mechanically found it so in a great Variety of Experiments ; and that every Turn or Revolution of the Engine under Water just measures 10 Feet, which I call the decimal hydraulical Circumference thereof.

The *Primum Mobile*, or Soul of this Machine, is in the Form of the Letter Y, and is made in Iron, or any other Metal : At each End of the Lines, which constitute the Angle, or upper Part of that Letter, are two Pallets not much unlike the Figure of the Log ;

Log ; one of which falls in the same Proportion as the other rises. The falling or pendent Pallet meeting a Resistance from the Water, as the Ship moves, has, by that Means, a circular Motion under Water, which is faster or slower, according as the Vessel moves. This Motion is communicated to a Dial within the Ship (which is fix'd either in the Master's Cabbin, or any other proper Place) by means of a Rope (of any convenient Length) fasten'd to the Tail of the Y, and carried to the Dial. The Motion being thus communicated to this Dial, which has a Bell in it, it strikes exactly the geometrical Paces, Miles, or Leagues, which the Ship has run. Thus is the Ship's Distance attained; and with equal Ease may the Forces of Tides and Currents be discovered by this Instrument.

The Figures adjoin'd more fully explain the first Movement of my Machine.

In Figure 5. A K C L and B H D I are the Pallets, which are work'd from the Legs D E and C E into the Form they appear, to a Breadth of about 4 Inches and a half. The Length of the Pallets (B D and A C) are 8 Inches. The Branches or Legs, D E and C E, are each 15 Inches and a half long, and 2 in Circumference, the Diameter of which is about two Thirds of an Inch; and the Angle C E D, which is contained between them, is 45 Degrees.

The Shank E F is of the same Thickness or Circumference with C E and D E, and is 27 Inches long. At the Point F there is a Ring, where one End of the Rope F G is hook'd to the Machine, the other End G being fixed to the Dial within the Ship or Vessel. This Rope may be about 5 Fathoms, more or less, according as the Dial is fixed high or low, in respect to the Surface of the Water.

In the Figure afore-mentioned, this Machine has but two Branches; however, it may be form'd of three, if not four, and adjusted to the same Standard or Measure: But as three or four Branches would be more subject to entangle themselves in Sea-Weeds, and thereby prevent the regular Motion of the Instrument, if not in some Measure impede the Ship's Way, I cannot but recommend their being made only of two Branches, in the Manner I have laid down; for, in my own Experiment at Sea, I have observ'd those made in this Form have been so far from being choak'd by Weeds, that if they encountered any at any Time, they have always cleared themselves of them, without the Trouble of hauling the Engine in; to the Ship to do it.

To regulate this Instrument, it may be done several Ways; as first, by opening or closing the Angle CED; secondly, by lengthening or shortening the Branches, or turning or bending more or less the Pallets AKCL and BHDI; and so in this Manner the Machine is brought to what Standard or Measure you please, to make the hydraulical Revolution to answer either to a geometrical Pace of 5 Feet, or to 10, 12, 14 Feet, &c.

The Machines of this Kind, which I have tried at Sea in all Sorts of Weather, did weigh some 4, others 5, and others 6 Pounds; the Weight of them not at all affecting the peculiar Property of the Instrument, or hindering the Regulation thereof according to the Methods I have laid down.

These Machines may be made of Tin as well as Iron, and so light as not to weigh above two or three Pounds, which may serve for any Boat, Wherry, Barge, &c. without any Hindrance to their Rowing or Sailing. The Manner of fixing them to a Ship, or Boat, is represented in *Fig. 6.*

I come now to the Explanation of three several Dials, any one of which may be used with this Machine.

The first Dial had three Indexes, one of which mark'd 10 Revolutions of the Engine, each Revolution 10 Feet ; so that of consequence the whole Round of the Circle was 100 Feet. As five of these Revolutions make 50 Feet, which I reckon to be (or at least should be) the Distance marked between each Knot on the Log-Line now in Use at Sea ; by holding the Half-minute Glass in one's Hand (which is always used with the Log-Line) one may, by Inspection, see how many Times 50 Feet she runs in half a Minute, and of course how many Miles in an Hour, without the Trouble of employing four or five Hands, as there generally is, in heaving the Log. My second Index on this Dial marked 100 Revolutions, which makes 1000 Feet, as the third Index did 1000 Revolutions, which is equal to 10,000 Feet ; and then a little Bell struck, signifying when the Ship had sailed that Distance, which may be also fitted to strike to any other Measure.

My second Dial had the Circle on its Plate divided into twelve Parts, so that as the Index past each Division, the Ship had run one Mile, and consequently twelve Miles, when it had measured the Circumference. On one Side of this Dial, I had fixed another Plate, which was graduated in such Manner, that by the Half-minute Glass I could also, by Inspection, tell what the Vessel run in that Space of Time, &c.

On my third Dial I had three Circles ; the first was so divided, as to shew when the Ship had run 60 Leagues ; the second was so contrived, as to shew when the Ship had run the same Distance in Miles ; and on the third was mark'd 120 Knots ; so that, computing

puting each Knot at 50 Feet, the Circumference was 6000 Feet, which I take to be the Standard of an *English* Maritime Mile, or the $\frac{1}{60}$ Part of a Degree upon the Equator; in running which Length, my Instrument has just 600 Revolutions; to which Distance a little Bell strikes to give Notice, to the Man at the Helm, of the Distance failed in that Time.

Besides the several Circles on this Dial (graduated as I have mentioned) I had also two Plates on each Side, having two Circles; one divided into 100 Leagues, and the other into 300 Miles; so that, without hearing the Bell strike to every Mile or League, one might at any Time see by them, what Number of Miles or Leagues the Ship had run, from the Time she had left her Port.

As to the Materials within the Dial, there is little more than common Clock-work.

As by this Machine I undertake to correct the Errors of the Log, I flatter my self that a Comparifon between that Instrument, and my Invention, will not be unacceptable to the Curious; I therefore present you with

A Comparative Discourse between the Log and my Instrument, which I chuse to call the Marine Surveyor.

1st. " **T**HE first Error I chuse to touch on, in relation to the *Log*, is in the half and quarter Minute Glasses; I think I may well affirm, that they are seldom or never true, in regard it rarely happens that we can find two to finish their Course in the same Space of Time; yet, if they did run their Sand out equally, it is no Demonstration of their Truth, since two, that are false, may do the same

" same, as well as two that are true. But, admitting
 " they were never so truly made, they are notwithstanding
 " subject to Error, since it is but too well
 " known, that dry and wet Weather have a great In-
 " fluence on them. Should the Half-minute Glasses
 " lack but two Seconds, or be two Seconds too long,
 " it makes an Error of some Miles in 24 Hours. If
 " the *Log* be hove by Quarter-minute Glasses, in like
 " manner defective, (which is the general Practice,
 " when the Ship has great Way) in doubling the
 " Knots, the Error is also doubled. Besides, when the
 " Ship runs after the Rate of 8 or 9 Miles an Hour,
 " (and the Line is left to run off of the Reel) it
 " rarely happens but some Fathoms are out, before
 " the Line can be stopp'd; though this may be small
 " in the Course of 24 Hours, and therefore disregarded;
 " yet in a long Voyage it will make a great
 " Addition to the many Errors in the Distance (which
 " we gain by the *Log*) which, added to those of our
 " Judgment, occasions so many that keep Journals
 " at Sea, to be a Shore, when they have reck-
 " oned themselves 50, 60, or more Leagues from
 " the Land; and others to be as many Leagues
 " from their Port, at the Time when they have
 " expected to make it.

" In the *Marine-Surveyor* it is not so; for this Instrument requires no Glasses of any Kind: Let the
 " Ship run fast or slow, it is the same, for it works in
 " Proportion, and the Bell strikes to every Mile accordingly. To evidence the Truth of this, I take
 " Leave to mention an Instance, *viz.* When I was
 " making my Experiments on the Canal, the Reverend
 " Dr. *Desaguliers*, one of the Members of this honourable Society, and several other Mathematicians,
 " at Times, were with me, and we measur'd out a
 " certain

“ certain Distance there ; upon which I fitted my
 “ Machine to strike to that Distance, and accordingly
 “ it did so. We then alter’d the Motion of the Boat,
 “ and row’d much faster to the Mark than we had
 “ done before ; however, the Bell struck, when we
 “ came up to it, to the greatest Exactness : And such
 “ is the Property of this Instrument, that it may be
 “ fitted to strike to Miles, Leagues, &c. as shall be
 “ thought proper. This Machine is made of Materi-
 “ als so durable, that one of them shall last 50 or 60
 “ Years ; and such is the Price, that they will prove
 “ as cheap or cheaper to the Government, than the
 “ *Log*, which is attended with an Expence of so ma-
 “ ny Lines, Glasses, &c. As for the making a Trial
 “ of this Instrument, it may be as fully done in the
 “ Channel, as in an *East-India Voyage* ; for if it an-
 “ swers to 20, 30, or 40 Leagues, the Reason holds
 “ good for as many Thousand.

2d. “ The chief Property of the *Log* is to have it
 “ swim upright, or perpendicular to the Plane of the
 “ Horizon. This is too often wanting in *Logs*, be-
 “ cause but few Seamen examine whether it is so or
 “ no, and generally take it upon Trust, being satis-
 “ fied, if it weigh a little more at the Stern than the
 “ Head. What erroneous Reckonings flow from hence
 “ is but too evident ; for if the *Log* does not swim
 “ upright, it will not hold Water, neither remain
 “ steady in the Place where it is heav’d, since the
 “ least Check of the Hand, in veering the Line, will
 “ make it come up several Feet. This repeated, the
 “ Errors become Fathoms, and perhaps Knots, which,
 “ how insignificant soever they may seem, are Miles
 “ and Parts of Miles, and amount to much in a long
 “ Voyage.

“ In

“ In-answer to this, the *Marine-Surveyor* is of such a Property, that there is no Necessity to take Care about its swimming; and it is a constant Truth, peculiar to this Instrument, that be the Ship’s Motion on the Water what it will, whether she runs one Mile faster or slower than another, yet all she runs, is exactly mark’d on the said Instrument, as appears plainly from some Tables of Experiments made by me in the River *Thames*, for obtaining the gradual Increase and Decrease of both Ebb and Flood.

3. “ The stretching and shrinking of the *Log-Line*, is another great Error in the Use of the *Log*; for when a new Line is first us’d, let it be ever so well stretched upon Deck, and measured as true as possible, it shrinks after wetting considerably; and therefore if we rely on the Line run out for the Ship’s Distance, we ought to measure and alter the Knots on it every Hour before we use it; but I am well assured that this is seldom done oftner than once a Week, and sometimes not above once or twice in a Voyage. What great Dependance then is there on a Reckoning kept by the *Log*? Since in this Case the Line will shrink so, as to add Miles to the other Mistakes of every 24 Hours. Again, when the Line is measured to its greatest Degree of Shrinking, it is generally left there; and when, by much Use, it comes to stretch again, it is seldom or never mended, although it will stretch beyond what it first shrunk. In short, such are the Errors incident to the *Log*, that I don’t wonder at our Neighbours the *Dutch* for preferring their *Chips* or an irregular Pulse to it; which conjectural Reckoning of theirs is obtained after the following Manner. They fix two Marks on the Side of the Ship at a certain Distance, when an ex-

“ perienced Person, standing at the foremost Mark, “ throws a Chip over-board, and counts the several “ Beats of his Pulse, during the Chip’s Passage from “ one Mark to the other ; and from thence it is they “ compute the Number of Miles that the Ship runs “ in an Hour.

“ As for the *Marine-Surveyor*, it is not hove with “ a Line, but is tow’d a Stern by a Rope ; and let “ that Rope stretch or shrink (be long or short) it is “ all one, for the Instrument will have the same true “ Revolutions. Should it be objected, that it holds “ Water, I affirm, from my own Experiments of it, “ that the *Log* haul’d in from 5 or 6 Knots, is much “ heavier upon the Hand ; and that the faster the “ Ship runs, the less Water this Instrument of mine “ holds, because it gives Way to the Water and turns “ quicker ; nay, I can venture to say, that it is so far “ from being any considerable Impediment to the “ Ship’s Way that she does not lose one Mile in an “ hundred by it. But should this Instrument be intro- “ duced into the Navy, in case of chasing an Enemy, “ or the like, it may be taken in at any Time, and “ let down again at Pleasure.

4. “ I appeal to all Seamen, if in a moderate Gale, “ when the Ship runs 5 or 6 Knots, two diffe- “ rent Persons (every way qualified) were to heave “ the *Log* immediately after one another, whether “ they would exactly agree. Surely no. Since ‘tis “ but Chance if they do so, and is what may not “ happen in an hundred Trials. I therefore affirm “ the *Log* to be very erroneous on this Account, and “ that the Error frequently increases with the Wind ; “ for in a stiff Gale, when a Ship has run about 8 or “ 9 Knots before the Wind, it has been known that “ two expert Seamen have hove the *Log* in this Man-

" ner, and on their comparing Notes, they have found
 " a Knot Difference ; sometimes it has been more, and
 " at others less, which must certainly make a strange
 " Confusion in the Reckoning. Under this Head I
 " take leave to observe, that when the *Log* is hove,
 " it is sometimes in so strong a Gale, that the Ship
 " runs 9 Knots ; but before it is hove again, there
 " may be such a Decrease of the Wind, that for half
 " of the Hour she may not run above 5 Knots. Her
 " true Distance sailed then, is the Mean between the
 " Extremes of 9 and 5 ; but this has been so far from
 " being consider'd by some *Chalkers of the Log-board*,
 " that it is but too well known, the Extremes have
 " been put for the Mean, and the contrary. Were
 " there Truth in the *Log*, two Ships in Company
 " would nearly have the same Account ; but it is
 " otherwise ; for we too often find many Leagues Dif-
 " ference in Reckonings, even on board the same
 " Ship. In a word, such Errors have been found in
 " the *Log* by some of my Acquaintance, that when
 " they have sailed between a Meridian and a Paral-
 " lel, the whole Difference on the *Log-board* has not
 " prov'd *Difference of Latitude* enough to agree with
 " their *Observation*, although each Day they had a
 " good observ'd Latitude, and no Currents.

" In the *Marine-Surveyor* we are so assured of the
 " Ship's Distance, that all Ships shall agree which are
 " in Company, as to their Reckonings, save that some
 " Allowance be made for Difference of Judgment in
 " the several Persons who keep Journals.

There are several other Cases equally, if not more
 momentous than what I offer here, wherein the *Ma-
 rine Surveyor* will be found to have the Preference of
 the *Log* ; but I forbear to mention them, chusing ra-
 ther to entertain you with undeniable Proofs of the

Usefulness of my Invention, which I persuade myself will be found to be of singular Advantage to the Trade and Navigation of my Country.

The following are the Substance of two Affidavits, taken under the Seal of the Royal Court at Guernsey, by some expert Seamen, who have had Trial of my Instrument, *viz.*

“ KNOW ALL MEN BY THESE PRESENTS, that
 “ on the 30th of November 1720, there personally
 “ appeared before *William Le Marchant Esq.* (Judge
 “ Delegate in the Island of Guernsey, &c.) Messieurs
 “ *Jean Andros*, and *Eleazar Le Marchant* (Jurats of
 “ the Royal Court of the said Island)

“ *William Akier*, aged about 40 Years, who com-
 “ manded several Privateers in the late War; (and
 “ particularly that call'd *La Chasse*, of about 150
 “ Tuns, 16 Guns, and 140 Men) and is now Master
 “ of the Ship call'd the *Eagle*, of which Vessel he is
 “ the only Proprietor, who voluntarily makes Oath,
 “ that on *Sunday the 9th of October 1720*, he parted
 “ from *Southampton* with several Gentlemen Passen-
 “ gers on board for *Guernsey*; that he had fix'd at the
 “ Stern of his Ship a new Invention call'd the *Ma-
 “ rine-Surveyor*, projected, to the best of his Know-
 “ lege, by *Mr. Henry de Saumarez*, a Gentleman of
 “ the Island of *Guernsey*, for correcting the *Log*, &c.
 “ That after they had left the *Needles*, they had a
 “ stiff Gale of Wind, attended with a rolling Sea,
 “ notwithstanding which, the Machine work'd as re-
 “ gularly as if it had been smooth Water, the little
 “ Bell of it striking to every Mile the Ship run with
 “ great Exactness. And this Deponent further de-
 “ clares, that having thoroughly view'd and examined
 “ the Experiment of this new Invention, he finds it
 “ to be not only practicable, but preferable to the
 “ common

“ common Methods us’d at Sea for attaining the
 “ Ship’s Distance sail’d ; that therefore, for the pub-
 “ lick Good, he doth attest the Truth of the above-
 “ mentioned Particulars. In witness whereof, the
 “ Seal of the Royal Court of *Guernsey* is hereunto
 “ affix’d by us the under-written,

William Le Marchant, Judge Delegate.
Jean Andros,
Eleazar Le Marchant, } Jurats.

The other Affidavits runs as follow, *viz.*

“ KNOW ALL MEN BY THESE PRESENTS, That
 “ on the 30th of *November* 1720, there personally
 “ appear’d before *William Le Marchant* Esq; Judge
 “ Delegate in the Island of *Guernsey*, &c. Messieurs
 “ *Jean Andros* and *Eleazar Le Marchant*, Jurats of
 “ the Royal Court of the said Island.

The following Persons, *viz.*

“ *Abraham Le Mesurier*, of about 48 Years of Age,
 “ formerly Captain of several Ships,
 “ *Peter Bonamy*, of about 58 Years of Age, for-
 “ merly Captain of several Ships, and who has used
 “ the Sea above 40 Years,
 “ *John Hardy*, of about 38 Years of Age, formerly Cap-
 “ tain of several Ships, *William Abier*, about 40 Years
 “ of Age, and formerly Captain of several Ships ; and
 “ *James Hubert*, of about 27 Years of Age, who has
 “ also been Master of several Vessels, who voluntar-
 “ rily make Oath, that on the 19th of *October* 1720,
 “ they set Sail in the Morning out of *Guernsey Pier*,
 “ with a fresh Gale of Wind, in a Sloop call’d the
 “ *Dolphin*, in Company with several Gentlemen of

" the said Island, in order to make an Experiment at
 " Sea of a Machine call'd the *Marine-Surveyor*, pro-
 " jected, to the best of their Knowledge, by Mr.
 " *Henry de Saumarez* of *Guernsey*; which Invention
 " is intended to correct the many Errors of the *Log*,
 " &c. And they further declare, that they have not
 " only throughly view'd, consider'd, and examin'd the
 " said Machine, but have also made several Experi-
 " ments of it in a rough Sea, sometimes sailing right
 " before the Wind, then quartering; at other Times
 " turning to Windward, and then lying by to know
 " the Drift of the Ship both with and against the
 " Tide: That having tried the same Invention all
 " Manner of Ways, they find it much preferable to
 " the *Log*, or any of the Methods in use for ob-
 " taining the Ship's Distance run, having nothing to
 " object against it, as to its being a *Clog* or Hindrance
 " to the sailing of the Ship &c. That being fully
 " satisfied of the great Usefulness of this Invention
 " for the Improvement of Navigation, and the Service
 " it may be of to all the Maritime Powers, they
 " publickly attest the Truth of the above-mentioned
 " Particulars, to the End the Author thereof may
 " make such Use of it, as he shall think most proper.
 " In witness whereof, the Seal of the Royal Court of
 " *Guernsey* is hereunto affix'd by us the underwritten,
 " Signed by the Judge Delegate and Jurats, as
 " above-mentioned.

Here you have some Proof of the Usefulness of this
 new Invention, and that from Seamen of long Stand-
 ing and Practice: But, notwithstanding these Testimo-
 nials, I was yet determined to have it tried further:
 Accordingly I made a Present of one of my Machines
 to a Friend of mine, Captain *John Thoumes*, who be-
 sides

sides his Knowledge in the Theory and Practice of Navigation, was the better qualified to make Trial of it, in regard he had sometimes accompanied me in my Experiment on the Canal in St. James's Park, and in the River *Thames*. As he was then going a Voyage, I intreated him to act impartially with me, and to lose no Opportunity in letting me know how far, and with what Certainty, my Invention might be depended on. Agreeable to my Request, he wrote twice to me on this Occasion: His first Letter was dated at *Nantes* the 20th of *October 1724*, and the following is an Extract of it, *viz.*

“ According to my Promise, I am to acquaint you, “ that I have had as favourable an Opportunity as I “ could have wish'd for, to try your *Marine-Surveyor*; “ for some Part of my Voyage being from *St. George's* “ Channel to the Bay of *Biscay*, I pass'd close to the “ Land's-End of *England*, with a moderate Gale of “ Wind at North, our Course *S. by E.* When I had the “ Land's-End East of me about 3 Miles, I began to “ reckon, and the next Morning, when *Ushant* bore “ West, about 5 Miles Distance, the *Surveyor* had “ made just 37 Leagues. These two noted Headlands, “ which are very near under the same Meridian, dif- “ fer in Latitude about 33 or 34 Leagues. As for “ the Tides, we cross'd them, having in this Run two “ Floods and two Ebb's; and as the Wind blew cross “ the Channel, one Tide was no more influenced by “ it than the other, nor could the Current be any “ Impediment to the Trial. Now as to our having “ 3 or 4 Leagues more than the true Distance, the “ Reason is very plain, since it cannot be expected “ but that a Ship before the Wind will deviate from “ her true Course, sometimes one Way, sometimes “ another, in her *Taws* and *Scheers*. Of this all Sea-
“ men

“ men are sensible. What I would remark from hence
 “ is, that the *Surveyor* measures all the little Traver-
 “ ses exactly ; 'tis therefore the Busines of the Navi-
 “ gator to allow for this, when he works the Ship's
 “ Run. But I cannot help observing here, that a good
 “ Effect is produced from these little Traverses being
 “ so measur'd ; for should we be running boldly on
 “ the Land in a dark Night, it forewarns us to look
 “ out in time, by marking somewhat more than the
 “ true Distance sail'd upon a streight Line.

“ Many are the Advantages which accrue to Navi-
 “ gation by this Invention, which I shall not take
 “ upon me to enumerate : In short, the Sailors are in
 “ love with it, and when at the Helm, they value
 “ themselves on chalking more Miles than those who
 “ went before them. For my own Part, I am so
 “ pleas'd with it, that I have done with the *Log*.
 “ One excellent Quality I observe in it, which I
 “ cannot omit mentioning, *h̄o*. That in plying to
 “ Windward along Shore in a dark Night, our usual
 “ Way, by the *Log*, is to stand two or three Hours
 “ out, and so many in ; and here we may be a shore
 “ before we are aware, because in running out we
 “ may not have had so much Wind as in running in ;
 “ or we may have reef'd Topsails, shorten'd Sail,
 “ hanker'd in the Wind, or have met with many
 “ other Impediments, which, by being drowsy in the
 “ Night, a Man may sometimes not take Notice of ;
 “ but it is otherwise with the *Surveyor* ; for if the
 “ Ship is hindered in her Way, it will not mark more
 “ Miles than she has run.

“ I have shew'd it to some curious Persons at
 “ *Nantes*, who are greatly delighted with it. They
 “ wanted to see the Movement within, but I shall
 “ never grant that to a Stranger. I have been offer'd

“ fifty Pistoles for it, and might have had more, would
 “ I have parted with it ; but I value the worthy Do-
 “ nor of it too much, to do any such Thing.

P. S. “ When I said my Course from the *Lands-*
 “ *End to Ushant* was *S. b E.* it must be understood
 “ that I did not go on the *Outide*, but pass'd within,
 “ between *Ushant* and the *Main* : For in the other
 “ Case, to pass to the *Westward*, the Course had been
 “ about *S. b W.* to go clear of all.

The second Letter, which I receiv'd from Captain *Thoumes*, in relation to my Instrument, was dated at *Guernsey* the 2d of *September 1725* ; and what follows is the Substance of it, so far as it relates to the *Marine-Surveyor*, viz.

“ I am now fully confirm'd of the Usefulness of
 “ your *Marine-Surveyor*, having tried it, this last
 “ Voyage to *Marseilles* and *Toulon*, sufficiently to
 “ persuade me, that it is greatly preferable to the *Log*.

“ Having in two former Voyages in the Bay of
 “ *Biscay* been apprized, that the Ship's Distance fail'd,
 “ as obtain'd by the *Marine-Surveyor*, was really true,
 “ yet I was oblig'd every 24 Hours to shorten the
 “ Distance by a certain Proportion, that I guest to be
 “ near one seventh Part of the Whole ; which, from
 “ the Bearings of Headlands, &c. I found constantly
 “ so. However, to be better satisfied of this Allow-
 “ ance, I wanted a long Run, near, or upon a Meri-
 “ dian, with good Observations, which could not be
 “ had in the Bay or our Channels ; therefore, when
 “ I sail'd for the *Mediterranean*, which was in *January*
 “ last, I continued to make the same Allowance, and
 “ caution'd my Mate to make it also. It happen'd,
 “ that for the first eight Days, we had hard Gales of
 “ southerly Winds, attended with violent Squalls of
 “ Rain, and a distracted Sea, insomuch that we try'd

“ under a double reef'd Main-sail, great Part of the
 “ Time, and drove to the Westward, without the Be-
 “ nefit of celestial Observations ; yet all the While the
 “ *Marine-Surveyor* struck the Miles of our Drift,
 “ which are to be seen upon our Journals for every
 “ Hour ; and so far did I depend on it, that I did not
 “ order the *Log* to be once hove.

“ After the bad Weather, the Wind chang'd with
 “ the new Moon, to *N. N. E.* and *N. E.* with a brisk
 “ Gale, which gave us a fair Run for five Days, near
 “ 50 Leagues every 24 Hours. We had daily Obser-
 “ vations, and our Course was near South. Here it
 “ was, that I found the one seventh of the Ship's Di-
 “ stance was to be deducted from the whole, and that
 “ it was for *Taws* and *Sheers*, which the *Marine Sur-*
 “ *veyor* marks exactly. After this Allowance was
 “ made, so well did my Reckoning agree with my
 “ Observation, that when there was 2 or 3 Miles dif-
 “ ference, I rather imputed it to the Want of Exact-
 “ ness in my observing, or a Fault in the Quadrant,
 “ than to the *Marine Surveyor*, in regard my Mate
 “ also found it to agree to a surprizing Exactness.

“ Three Weeks after our Departure, I had the
 “ Misfortune to lose the Fork of the Machine, and
 “ therefore was afterwards without the Help of the
 “ *Surveyor*, till our Arrival at *Toulon* ; which Place
 “ being one of the chief Nurseries for Navigators
 “ that serve the *French* King, I was the more con-
 “ cerned for my Loss ; but I in some measure repaired
 “ it, by ordering a Smith to make two such Forks, of
 “ nearly the same Dimensions and Furns in the Fins,
 “ as I could remember the other had, which serv'd
 “ there so well, as to gain the Admiration of all who
 “ saw me try it. My Merchant was so taken with it,
 “ that he desir'd me to shew it to a Friend of his, a
 “ noted

“ noted Professor of the Mathematicks in the College
 “ of Jesuits there. He was all Surprize at the regu-
 “ lar Motion of the Machine under Water, and more
 “ that it should so nicely determine the Distance
 “ sail’d of any Ship or Boat. I should swell my Let-
 “ ter to too great a Bulk, should I repeat the Conver-
 “ sation I had with this Jesuit, who importun’d me
 “ much to see the Inside of the Clock-Work, offer-
 “ ing me what I pleas’d for a Sight of it. In a word,
 “ I was deaf to him, and many other Gentlemen of
 “ the Town, who crowded to me every Day on the
 “ same Account, and who were all greatly pleased
 “ with the Invention.

“ The Machine made by my Directions at *Toulon*,
 “ I us’d in my Way home, and found it to answer
 “ very well in the Ocean; from whence arises this
 “ Remark, which sufficiently shews the Usefulness of
 “ your Invention, *viz.* That even rough ones, made
 “ by a meer Cobler of a Smith, and turn’d by the
 “ Directions of a short Memory, which I dare not
 “ trust in many Things, are capable of answering the
 “ End for which you invented them.

“ It must be noted, that though I allow one seventh
 “ of the Ship’s Distance for her Deviation from her
 “ Course, yet some Ships are so built, that they will
 “ steer much truer, and others worse than ours did;
 “ and in this Case the *Marine-Surveyor* shews its
 “ Worth; for if two Ships are in Company, the one
 “ steering well, the other ill, the Latter shall have
 “ more Miles than the Former on comparing their
 “ Run, although they set out from the same Port, and
 “ never part Company.

I should be wanting to my self, if I did not produce
 the most convincing Proof of the Usefulness of this
 new Invention; I shall therefore add to the foregoing

Testimonials, some other Certificates whereby it will further appear, that the *Marine Surveyor* has the Preference of the *Log*, viz.

“ We the underwritten Masters of Ships, &c. do
 “ certify all whom it may concern, That this 21st of
 “ October 1725, we accompanied Mr. *Henry de Sau-*
 “ *marez* on board the *Richard Yatch*, in order to
 “ make an Experiment of an Instrument invented by
 “ him, call'd the *Marine-Surveyor*; and as by it he
 “ propos'd to ascertain the Way of a Ship in the Sea,
 “ much more correctly than by any Thing hitherto
 “ invented for that Purpose, we tried it between *Lon-*
 “ *don* and *Gravesend* with the *Log* (which we hove
 “ several Times) to which it appears to us to have
 “ the Preference; for by its constant and regular Mo-
 “ tion, the Ship's Distance sail'd must be more exactly
 “ attain'd than by the *Log*; which being hove but
 “ once in an Hour or two, cannot be so correct, in
 “ regard the Wind may increase or lessen soon af-
 “ ter the *Log* is hove, in such Manner, that it entire-
 “ ly depends on him who chalks the *Log-board* to
 “ allow for it. As therefore very considerable Errors
 “ must arise from thence, if a proper Allowance is
 “ not made for an Increase and Decrease of Wind; and
 “ as the *Marine-Surveyor* is not subject to this, but
 “ keeps a regular Motion, according as the Wind is
 “ more or less: We are therefore of Opinion, that
 “ this new Invention is not only an ingenious Con-
 “ trivance in its Kind, but is exactly calculated for
 “ the Ends proposed. As witness our Hands this 21st
 “ of October 1725.

“ Sign'd in the Original

Michael Hales,
 Benjamin Hutchinson,
 Josiah Hales,
 Peter Perchard,
 Robert Gamble. “ These

" These are to certify all whom it may concern,
 " that I *John Harris*, who have us'd the Sea for thir-
 " ty Years past and who was lately Mate of the
 " *William and Thomas*, bound from *London* to *Canso*
 " in *America*, was present, when Mr. *Henry de Sain-*
 " *marez* came on board our Vessel and fix'd an In-
 " strument at the Stern of her, call'd the *Marine-*
 " *Surveyor*, invented by him for ascertaining the
 " Way of a Ship in the Sea, much more correctly
 " that by the *Log*, or any Method hitherto in Use
 " for that Purpose: And as he desir'd us to try it
 " with the *Log*, and to make an impartial Report
 " whether we found it preferable to the *Log* or not;
 " I do hereby, in Justice to that Gentleman, certify,
 " That we kept our Reckoning both by the *Log* and
 " this Instrument, and do find it much preferable to
 " the *Log*, or any Thing that has yet appeared to me
 " for attaining the Ship's Distance sail'd; the Truth
 " of which I am ready to testify on Oath, if call'd on
 " to do it. In witness whereof, I have hereunto set
 " my Hand this 15th of *November*, 1725.

" Sign'd in the *Robert Gamble*, *John Harris*.
 " Presence of *Elisha Dobree*,

It may perhaps be asked, how I came to produce a Certificate from the Mate, and not from the Captain of the *William and Thomas*? To which I answer, that the Mate left the Ship at *Plymouth*, and came to Town, so that I had an Opportunity of obtaining his Opinion of it, without the Captain's, who soon after his Arrival in *England*, made the best of his Way to the Island of *Guernsey*: However, as I had desir'd him to try my Instrument with the *Log*, and impartially report to me, whether he found it preferable, or not, to that Method of obtaining the Ship's Distance sail'd; he

he favour'd me with a Letter from thence : His Name is *Thomas Picot*, and his Letter bears Date the 16th of November 1725 ; it is in *French*, and the Substance of it in *English*, is as follows, *viz.*

“ That he had made use of the *Marine-Surveyor* in
 “ his *Voyage to Canso in America*, and had been more
 “ than ordinarily careful therein, in order to make a
 “ just Report of it ; that he had tried it upon a *Me-
 ridian* with good Observations, and found it to an-
 “ swer his Expectation, and to be preferable to the
 “ *Log*, particularly in rough and stormy Weather ;
 “ that it had been much admir'd by several Masters
 “ of Ships, and particularly by Captain *St. Loe*, of his
 “ Majesty's Ship the *Ludlow-Castle*, who express'd a
 “ great Liking to it. He concludes his Letter with
 “ wishing I had an Opportunity to peruse his Journ-
 “ als, whereby it would fully appear how much my
 “ Invention is preferable to the *Log*.

Being inform'd, that Captain *Henry Daniell* had come over as a Passenger from *Canso in America*, to *England*, in the aforesaid Vessel *William and Thomas* ; and being willing to obviate every Objection that might be brought against the *Marine-Surveyor*, I applied my self to that Gentleman for his Opinion of it, who was pleased to send me the following Certificate.

“ **T**HESSE are to certify all whom it may concern, that I *Henry Daniell*, who
 “ have been at Sea upwards of twelve Years, first as a *Voluntier*, and af-
 “ terwards as a *Midshipman*, did lately come over as a *Passenger* in the *William*
 “ and *Thomas*, from *Canso to Plymouth*, in which Vessel there was an *In-
 strument* fix'd at the *Stern* of her, call'd the *Marine-Surveyor*, invented by
 “ *Mr. Henry de Saumarez*, for ascertaining the *Way* of a *Skip* in the *Sea* ; and
 “ as that Gentleman has applied to me for my Opinion of it, I do hereby certify,
 “ that we found it much more correct than the *Log* ; and that in a *Gale* of
 “ *Wind*, our *Reckoning* by it agreed with our *Observation*, which the *Reckoning*
 “ by the *Log* seldom did. And I must, in *Justice* to that Gentleman, say, that
 “ we kept our *Reckoning* both by his *Instrument* and the *Log*, and found it
 “ much preferable thereto, or to any other *Method* for obtaining the *Ship's Di-
 stance*. In witness whereof, I have hereunto set my Hand this 4th of De-
 “ cember 1725.

H. Daniell.

F I N I S.